

Claims

I claim:

1 1. A method of generating a differential image of an object
2 in a light scattering medium, comprising the steps of:

3 illuminating a portion of said light scattering medium
4 with a single burst of illuminating light to generate
5 reflected light therefrom;

6 providing a charge generating photosensitive device in
7 the path of said reflected light;

8 activating said charge generating photosensitive device
9 for a period of time during which a portion of said reflected
10 light is collected by said charge generating photosensitive
11 device in the form of a generated charge that is indicative
12 of an image each instant of time during said period of time;

13 providing a first charge storing device and a second
14 charge storing device, each of which is independently
15 operatively coupled to said charge generating photosensitive
16 device;

17 storing, on said first charge storing device, said
18 generated charge present on said charge generating
19 photosensitive device during a first part of said period of
20 time wherein a first image is defined;

21 storing, on said second charge storing device, said
22 generated charge present on said charge generating

23 photosensitive device during a remaining part of said period
24 of time wherein a second image is defined; and
25 generating a difference between (i) said generated
26 charge associated with said first part of said period of time
27 and (ii) said generated charge associated with said remaining
28 part of said period of time.

1 2. A method according to claim 1 wherein said first part of
2 said period of time and said remaining part of said period of
3 time are the same in duration.

1 3. A method according to claim 1 wherein said first part of
2 said period of time and said remaining part of said period of
3 time are different in duration.

1 4. A method according to claim 1 further comprising the step
2 of applying, prior to said step of generating, a scaling
3 factor to one of (i) said generated charge associated with
4 said first part of said period of time and (ii) said
5 generated charge associated with said remaining part of said
6 period of time.

1 5. A method according to claim 2 further comprising the step
2 of applying, prior to said step of generating, a scaling
3 factor to one of (i) said generated charge associated with
4 said first part of said period of time and (ii) said
5 generated charge associated with said remaining part of said
6 period of time.

1 6. A method according to claim 5 wherein said scaling factor
2 has a value in the range of approximately 0.5 to 10.

1 7. A method according to claim 1 further comprising the step
2 of draining said generated charge from said charge generating
3 photosensitive device when said period of time terminates.

1 8. A method of generating a differential image of an object
2 in a light scattering medium, comprising the steps of:

3 illuminating a portion of said light scattering medium
4 with a single burst of illuminating light to generate
5 reflected light therefrom;

6 providing a charge generating photosensitive device in
7 the path of said reflected light;

8 activating said charge generating photosensitive device
9 for a period of time during which a portion of said reflected
10 light is collected by said charge generating photosensitive
11 device in the form of a generated charge that is indicative
12 of an image each instant of time during said period of time;

13 providing a first charge coupling device (CCD) and a
14 second charge coupling device (CCD), each of which is
15 independently operatively coupled to said charge generating
16 photosensitive device by means of a first output line and a
17 second output line, respectively;

18 simultaneously applying, during a first part of said
19 period of time, a high potential to said first output line
20 and a low potential to said second output line wherein said
21 generated charge present on said charge generating
22 photosensitive device during said first part of said period
23 of time accumulates only on said first CCD and defines a
24 first image;

25 simultaneously applying, during a remaining part of
26 said period of time, a high potential to said secnd output
27 line and a low potential to said first output line wherein
28 said generated charge present on said charge generating
29 photosensitive device during said remaining part of said
30 period of time accumulates only on said second CCD and
31 defines a second image; and

32 generating a difference between (i) said generated
33 charge associated with said first part of said period of time
34 and (ii) said generated charge associated with said remaining
35 part of said period of time.

1 9. A method according to claim 8 wherein said first part of
2 said period of time and said remaining part of said period of
3 time are the same in duration.

1 10. A method according to claim 8 wherein said first part of
2 said period of time and said remaining part of said period of
3 time are different in duration.

1 11. A method according to claim 8 further comprising the
2 step of applying, prior to said step of generating, a
3 scaling factor to one of (i) said generated charge associated
4 with said first part of said period of time and (ii) said
5 generated charge associated with said remaining part of said
6 period of time.

1 12. A method according to claim 9 further comprising the
2 step of applying, prior to said step of generating, a
3 scaling factor to one of (i) said generated charge associated
4 with said first part of said period of time and (ii) said
5 generated charge associated with said remaining part of said
6 period of time.

1 13. A method according to claim 12 wherein said scaling
2 factor has a value in the range of approximately 0.5 to 10.

1 14. A method according to claim 8 further comprising the
2 steps of:

3 draining said generated charge from said charge
4 generating photosensitive device immediately prior to the
5 commencement of said period of time; and

6 draining said generated charge from said charge
7 generating photosensitive device immediately after said

8 period of time terminates.

1 15. A system for generating a differential image of an
2 object in a light scattering medium when a portion of said
3 light scattering medium has been illuminated with a single
4 burst of illuminating light to generate reflected light
5 therefrom, said system comprising:

6 a charge generating photosensitive device placed in the
7 path of said reflected light, wherein said charge generating
8 photosensitive device is activated for a period of time during
9 which a portion of said reflected light is collected by said
10 charge generating photosensitive device in the form of a
11 generated charge that is indicative of an image each instant
12 of time during said period of time;

13 a first charge coupling device (CCD) independently
14 operatively coupled to said charge generating photosensitive
15 device by a first output line;

16 a second charge coupling device (CCD) independently
17 operatively coupled to said charge generating photosensitive
18 device by a second output line;

19 means for simultaneously applying, during a first part
20 of said period of time, a high potential to said first output
21 line and a low potential to said second output line wherein
22 said generated charge present on said charge generating

23 photosensitive device during said first part of said period
24 of time accumulates only on said first CCD and defines a
25 first image;

26 means for simultaneously applying, during a remaining
27 part of said period of time, a high potential to said second
28 output line and a low potential to said first output line
29 wherein said generated charge present on said charge
30 generating photosensitive device during said remaining part
31 of said period of time accumulates only on said second CCD
32 and defines a second image; and

33 processing means for generating a difference between
34 (i) said generated charge associated with said first part of
35 said period of time and (ii) said generated charge associated
36 with said remaining part of said period of time.

1 16. A system as in claim 15 further comprising means,
2 coupled to said charge generating photosensitive device, for
3 draining said generated charge from said charge generating
4 photosensitive device immediately prior to the commencement
5 of said period of time, and for draining said generated
6 charge from said charge generating photosensitive device
7 immediately after said period of time terminates.

1 17. A system as in claim 16 wherein said means for draining

2 comprises a drain line having a high potential applied
3 thereto while each of said first output line and said second
4 output line have a low potential applied thereto.